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THESIS

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AN ANALYSIS OF THE EFFECTIVENESS OF ELECTRONIC MAIL IN THE UNITED STATES COAST GUARD

by

Robert E. Day Jr.

June 1988

Thesis Advisor: James E. Suchan

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The study uses input data from survey forms returned by 108 Coast Guard Officers, Civilians, and Enlisted personnel stationed at United States Coast Guard Headquarters, Washington, D.C.

The study arrives at several statistically significant conclusions on how the Coast Guard should evaluate, design, and manage communications such as electronic mail in order to maximize effectiveness. Specifically, the study found that:

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* the overall perceived effectiveness of the USCG e-mail is significantly influenced by perceptions from the personal perspective.

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An Analysis of the Effectiveness of Electronic Mail in the United States Coast Guard

by

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Lieutenant, United States Coast Guard
B.S.E.E., United States Coast Guard Academy, 1980

Submitted in partial fulfillment of the
requirements for the degree of

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I. INTRODUCTION

A. OVERVIEW

Organizations of all types are seeking to improve productivity by using office automation equipment such as word processors, management information systems, and electronic mail. These systems have the potential to improve productivity by making the tasks of document preparation, information analysis, and communicating more efficient. But, social researchers are finding that office automation technology is affecting more than just efficiency.

The installation and use of this technology can permanently affect the way social and work activities are organized. Preliminary findings from social research experiments indicate that negative social impacts can seriously impair the overall effectiveness of office automation systems. Thus, personnel responsible for implementation of office automation technology should consider the social impacts of these systems as being as important as efficiency concerns.[Ref. 1]

Despite the apparent need for organizations to evaluate these systems' social and human effects, there appears to be little information and few methodologies available to help organizations assess social impacts and thus evaluate the overall effectiveness of office automation systems.

B. MEASURING EFFECTIVENESS

Organizations place significant emphasis on economic analysis of any plans proposing changes in the way the organization conducts its business. This emphasis can be seen by the existence of organizational departments whose sole task is to continually analyze organizational procedures and policies from an economic perspective. Personnel in these departments use a variety of proven techniques and systems to quantitatively analyze economic data. This type of analysis is conducted to identify differences in costs between the current and proposed systems. The results from economic analysis provides a measure of the economic effectiveness of the proposed system.

Although measures of economic effectiveness are important when considering the implementation of office automation technology, organizations also need to analyze these systems from a variety of other perspectives, particulary the impact they will have on the organization's social fabric. This analysis of social and human factors could be somewhat similar to the economic analysis described above; the differences in social and human attributes between the current and proposed systems could be identified and associated to some measure of cost (not necessarily in economic terms). This type of evaluation would provide organizations with a measure of effectiveness based on social and human concerns. This measure could be evaluated with the economic measure to determine the overall effectiveness of the proposed system.

Unfortunately, the analysis of social and human concerns associated with office automation technology does not seem to receive the same degree of emphasis that economic analysis is given. This is evident by the lack of methodologies available to organizations for conducting this type of analysis and the reluctance of organizations to dedicate resources to evaluate such impacts.

C. RESEARCH OBJECTIVES

This study will develop a methodology for measuring differences in organizational communication systems from a human and social perspective. Also, the importance of these differences to the overall effectiveness of an organizational communication system will be investigated through empirical research of two United States Coast Guard (USCG) communication systems.

The two organizational communication systems to be evaluated are the USCG record message system and electronic mail. These systems were selected because:

* the record message system is a unique and well established USCG organizational communication system.
* electronic mail represents one type of new office automation technology being integrated into many organizations including the USCG.

The record message system is primarily used by the Department of Defense (DOD) and other government agencies such as the USCG. The following section familiarizes non-government personnel with the record message system. Electronic mail is fully described in chapter III.

1. Record Messages

Record messages are the primary method by which DOD and other government agencies exchange official communications between commands. The system, which includes both equipment and personnel resources, is designed to maintain a high degree of accountability for each message entering the system; thus, the term "record" message is used because the system "records" each step the message takes on its route between the originator and designated receiver.

Record messages are sent electronically over circuits specifically designated for official message traffic. Major USCG shore commands are interconnected by the **Auto**matic **Di**gital **N**etwork (AUTODIN) circuits operated by DOD. All record messages enter and exit the AUTODIN system through communication centers located at each major USCG shore command. Communication centers have the primary responsibility for interfacing with the AUTODIN system and maintaining accountability of record messages. Therefore, end users (senders and receivers of record messages) do not directly interface with the record message system, but access it via communication center personnel.

The procedures required to access and use the record message system make it very unique when compared to other USCG organizational communication systems. The differences between the record message system and other communication systems will be more fully discussed in the following chapters. Also, the effects of the record message systems uniqueness from the human and social perspective are investigated in this study. The following section summarizes the research objectives of this study.

2. Summary of Research Objectives

The study will address the following questions related to the effectiveness of electronic mail as a method of communicating in the USCG:

* What methodologies can be used to assess the human and social impacts of communication systems such as e-mail?

* Do Coast Guard users identify significant differences between electronic mail and record messages from a human, social, and technical perspective?

* What effect does any of the above differences have on the users feelings about the effectiveness of electronic mail as a USCG communication channel?

* Do the differences identified and attitudes towards effectiveness vary between functional categories of USCG personnel?

The answers to these questions are important to both the economic and human relations effectiveness of the USCG electronic mail system. These answers will provide insight into how the USCG can better design, implement, and manage the USCG e-mail system. Furthermore, the study's results will provide USCG managers with guidelines for determining what types of communications the e-mail system can be effectively used for. Finally, the methodology used by this study may be useful to the USCG or DOD in assessing the effectiveness of other organizational communications systems from a human relations perspective.

II. REVIEW OF LITERATURE

A. OVERVIEW

The electronic office is rapidly becoming a reality. Organizations of all sizes and types are striving to take advantage of potential productivity increases offered by computer technology and telecommunication systems. The degree of use of such systems was investigated by Hellweg [Ref. 2]. Hellweg's survey of Fortune 500 corporations found of the 94 responding corporations:

* Fifty-six percent used electronic mail.
* Ninety-four percent used interactive computers.
* Ninety-seven percent used word processing systems.

As Hellweg's research indicates, office automation is affecting all areas of the business environment. The area of particular concern to this study is organizational communication. As the level of office automation increases, communication via computers is likely to become a major factor in the operation of most businesses. This view is supported by a survey of members of the Association for Business Communication (ABC) and members of the Office Systems Research Association (OSRA). Of the 100 members surveyed from each organization, 98 and 100 percent respectively felt that electronic communication systems are likely to be important means of organizational communication within the next decade. [Ref. 3]

The rapid deployment of computer communication equipment into organizations has been mandated by corporate management in order to attain potential productivity increases. However, decisions to automate have generally been made with relatively little knowledge of their behavioral and societal impacts. This is because organizational communication researchers have not even begun to address many issues which surround the use of this type of communication channel.

The purpose of this chapter is to define electronic mail and describe some of its major characteristics. This is followed by a brief review of research that has been conducted in the area of computer-mediated communication. Researchers who have focused on electronic mail are given particular attention.

Most of the research in this area has dealt with technical aspects of e-mail. The research has focused on electronic mail's efficiency compared to other channels, its types of uses, or behavioral impacts of electronic mail systems. Very little research has discussed the overall **effectiveness** of electronic mail systems as a method for organizational communication.

B. DEFINING ELECTRONIC MAIL

Electronic mail is known by a variety of names and encompasses many different applications. Thus it is important to identify the context in which both this study and other researchers define and view electronic mail. Throughout this study the terms electronic mail and e-mail are used synonomously.

1. **Electronic mail**

Electronic mail as used in an office environment is seen as computer-assisted interpersonal communication [Ref. 4]. The e-mail system can be used to create, edit, transmit, receive, display, and store communications between two entities. The length and type of communication is immaterial; it can range from a one sentence invitation to dinner to a forty page organizational policy statement.

For the purposes of this study, the definition of electronic mail is narrowed to individuals personally interacting with a computer terminal, generally one that is considered his/her own, to send and receive messages. This narrowed definition is required because there are many organizations, particularly DOD, which maintain computer based messaging systems that individuals can use, but can not directly interact with.

A good example of one such systems is the DOD record message traffic system known as AUTODIN. To use AUTODIN, personnel prepare messages in hard copy form and deliver the message to a local communications center. Personnel operating the communication center input the message into the AUTODIN system. The message is delivered to the nearest communication center of the message addressee. Personnel at the receiving communication receive the message, prepare hard copies, and deliver the message to the addressee. The only people who physically interact with the computer based communication system are the communication center personnel, not the message originator or receiver.

2. Characteristics of electronic mail

This section identifies characteristics that are associated with communication via electronic mail. These characteristics are important features which affect both the uses and impacts of the system within any organization.

a. Asynchronous

One of the major advantages cited by both the marketers and users of electronic mail is that it eliminates "phone tag". Phone tag is the frustrating phenomenon of calling a person who is not in, leaving a message, having the call returned with you not being available, and so on. E-mail allows users to send and receive communications whenever they desire. The store and forward capability of electronic mail systems allows people to exchange information without having to do so in real time. [Ref. 5:p. 4]

b. Text Based

Communications sent via electronic mail are generally text based. Most e-mail systems allow for a wide range of formats and varying degrees of message permanence or self documentation. These capabilities are generally dependent on the e-mail system software.

E-mail systems generally allow the user to prepare messages in whatever format, the manner in which the text is arranged for presentation, they desire. Some organizations have very distinct rules on the formats to be used for various types of communications. For example, the U.S. Coast Guard correspondence manual specifies the margins, spacing, and arrangement for most all types of communications. The format flexibility of e-mail allows for a wide range of different types of communications to be sent, from a unstructured personal note to a fully formatted business letter [Ref. 6:p. 1494].

Some e-mail systems allow for the attachment of materials to the e-mail message, much the same as paper clipping an attachment to a regular letter. Attachments can be more text, computer files, or even complete computer programs.

The degree to which electronic mail is self documenting is software dependent. Self documentation is the processes of recording the creation, transmission, and receipt of messages. Many e-mail systems have the capability to automatically assign identification numbers and date/time stamp all messages transmitted and received. Systems with this capability generally keep a log of when, where to/from, and who to/from messages were sent and received. This information can be used for system management or to track and validate communications.

Another important software dependent characteristic of e-mail is the permanence of messages sent and received on the e-mail system. Some e-mail systems maintain copies, electronically or by producing hard-copy for manual filing, of all messages sent and received. Another aspect of permanence is the degree to which the user can access these stored records to either edit or delete them. The main purpose for the self documentation and permanence features of e-mail systems is to provide accountability.

a. Speed, Distance, and Multiple Delivery

Electronic mail can deliver messages across great distances in a matter of seconds to one or more destinations. E-mail has the capability to be an information accelerator, a tool that reduces the amount of time it takes for people to get information they otherwise would have received more slowly [Ref. 6:p. 1492]. Electronic mail can also deliver a letter to any destination with a compatible electronic mailbox much faster than the best letter delivery service (Federal Express, etc.), and as will be discussed in the following section, do it cheaper.

The speed characteristic is often the major justification for electronic mail use. But how often is it necessary that messages be delivered almost immediately? The information acceleration capability of e-mail, although generally viewed as a positive effect, may have some negative side effects. The ease and speed at which users can send information has the potential to:

- * Cause information overload on the receivers end.
- * Cause non-pertinent information or information not requiring rapid delivery to be sent.
- * Alter expectations and perceptions about message transfer requirements. Senders may expect receivers to respond much more quickly because of e-mail [Ref. 7:p. 2].
- * Because of the perceived requirement for quick response, information in responses may be incomplete or incorrect.

These potential side effects of using e-mail must be considered of equal importance as the increases in productivity and efficiency e-mail systems can provide.

3. **Efficiency versus effectiveness**

> The use of new technology may reduce the cost of written message transfer services and increase the speed of message communications. However, such technologies should not be adopted solely on the basis of cost reductions or speed advantages. The effects of technological change often reach far beyond the primary areas of intended application, which, in turn, may impede the subsequent implementation of socially efficient technologies. [Ref. 7:pp. 2-3]

Although e-mail systems can make the communication process extremely efficient, it does not guarantee effectiveness. The effectiveness of electronic mail will be addressed in detail in the following chapter, but a broad overview of effectiveness is appropriate before discussing electronic mail research.

Electronic mail effectiveness, as defined in this study, is the degree to which e-mail actually improves organization communication and performance. It can be viewed as how the characteristics of e-mail actually translate into improved performance in terms of increased productivity, efficiency, and user satisfaction.

As discussed in the previous section, the speed characteristic of e-mail can provide for extremely fast and cost **efficient** transfer of information when compared to other communication medias. But the **effectiveness** of the information exchange must take into account many other factors other than the pure efficiency.

Several examples of factors which might determine the effectiveness of e-mail are:

* The degree to which rapid communication was necessary.
* The perception of the receiver towards e-mail versus other communication channels.
* The extent to which rapid information exchange leads to better decision making.
* The possibility of e-mail overloading the receiver with information.

In short, efficiency and effectiveness must be examined against very different criteria.

C. CURRENT RESEARCH

Much of the research conducted on electronic mail has dealt with technical implementation or efficiency analysis. These studies generally indicate that in variety of situations electronic mail is a technically feasible and cost effective communication method. As previously indicated the studies only consider the **efficiency** of electronic mail compared to other modes of communication; however, they do not address potential effectiveness of e-mail from the users' perspective. A brief discussion of the findings from these studies are listed in the following section.

Behavioral and communication researchers have addressed electronic mail from the a organizational impact perspective. This research, although extremely important, does not seem to address how electronic mail can or will enhance communication effectiveness. Sara Kiesler, who has written extensively on electronic mail, sums up the problem in the following:

> Although we know that effective communication results in acceptable outcomes and actions that meet people's goals, we do not have a clear understanding of how to measure the communication's effectiveness. [Ref. 8:p. 50]

1. Technical and Efficiency Studies

Most of the electronic mail research in this area focuses on the advantages in efficiency that are gained by the asynchronous and speed characteristics of electronic mail. In these types of studies the cost for creating, sending, and receiving communications via a specific communication method (memo, phone call, meeting) are compared with the cost of sending the same messages via e-mail.

A good example of these types studies is one conducted by Digital Equipment Corporation (DEC), a major manufacturer of computer equipment. DEC supports one of worlds largest electronic mail systems. Almost all of DEC's 90,000 employees are accessible by the system and 40,000 employees have individual accounts. During the early stages of system implementation DEC accountants' requested that the cost of the e-mail equipment being installed be justified. The response to the accountants was a cost-benefit analysis discussed below.[Ref. 9:p. 109]

The DEC study was based on the responses by 1000 users of DEC's e-mail system to the question "What methods of communication would they normally have used for messages if they did not have an electronic mail account?" The responses to the survey are shown in Table 2.1.

TABLE 2.1 [Ref. 9]
ALTERNATE COMMUNICATION MODES

Internal memo	38%
Telephone	29%
Internal Telex	14%
Meeting	9%
Handwritten Note	7%
Nothing	3%

By combining standard work measurement methods with known expenses, DEC personnel calculated a cost per message for each of the methods listed in Table 2.1 and electronic mail. Table 2.2 is a summary of the cost comparison where the cost of a single electronic mail message is used as the base factor of 100%.

TABLE 2.2 [Ref. 9]
COST COMPARISON OF ALTERNATIVE METHODS

Medium	Original	Copy
E-mail	100%	23%
Memo	140%	29%
Telephone (internal)	80%	80%
Telex (internal)	120%	26%

The bottom line of the DEC study was when viewed on a cost basis, electronic mail had a 30% cost advantage over the other communication techniques when more than three copies of the same message was required [Ref. 9:p. 111].

Studies conducted by Hiltz and Turoff [Ref. 10] support the economic efficiency of e-mail when compared to other mediums. Table 2.3 summarizes cost comparisons between various mediums. The comparisons are based on sending a 221 word message via the medium. Hiltz and Turoff considered all cost associated with the preparation, transmission, and reception of the message. For example, when determining telephone costs, they considered the length of time to deliver the message at a normal speaking rate, allowed for some non-relevant exchange, and considered the possibility of not reaching the desired party on the first try.

TABLE 2.3
RESULTS OF HILTZ AND TUROFF STUDIES [Ref. 10:pp. 419-425]

Medium	Cost Range ($/per message) Low	High
E-mail	.45	1.08
Telephone	1.95	3.68
U.S. Mail	.87	1.47
Facsimile	1.92	

The cost per message for face to face meetings was found to be $2.71 for the first day of the meeting and decreased rapidly as the number of days the meeting continued. The high cost for the first day is due to the cost of travel to get to the meeting.

Although the DEC and Hiltz/Turoff studies shows that e-mail can provide distinct cost advantages over other mediums, this view of cost is very limited. There are numerous other factors which make must be assessed to get a true reading of cost. For example:

- e-mail is more expensive than a short phone call, but cheaper than a session of "phone tag".
- e-mail is cheaper than a trip across town, but more expensive than a walk down the hallway. [Ref. 10]

Again the major point that studies of this type fail to address is the effectiveness of communications sent by electronic mail. The research has shown that e-mail can be extremely cost and time efficient which may impact effectiveness positively. But the studies fail to investigate the factors that may be associated with the behavioral and social impact of this medium.

2. Behavioral and Social Research

Research on the behavioral and social effects of computer communication can be summarized into four categories. These categories are:

- Technology assessment studies: Studies examining the potential impact of introducing computer technology into social institutions.
- Organizational studies: Studies which examine the impact of computer communication systems on jobs and job performance.
- Technical capabilities studies: Studies which examine how people adapt to the use of computer communication as a function of the system and software design.
- Social psychology studies: Studies which investigate the effects of computer based communication on organizational communication and behavior. [Ref. 12:p.158]

The following sections discuss major findings from organizational, technical capabilities, and social psychology studies reviewed.

a. Technology assessment

A prime example of this type of study is a paper by Sara Kiesler [Ref. 1] which warns consumers of computer communication systems of the potential social effects these systems can have on users. The heart of Kiesler's article focuses on the potential effects of new technology which she states has three orders of effect. These effects are:

- Intended technological effects-- The planned improvements in efficiency that justify investments in new technology.
- Transient effects--Organizational adjustments made when a technology is introduced but eventually disappear.
- Unintended social effects--The permanent changes in the way social and work activities are organized.

Kiesler states "Smart executives try to make decisions about technology that win on the first level, minimize losses on the second, and retain flexibility and options on the third." [Ref. 1:p. 46] In essence, Kiesler statement is that the **effectiveness** of new technology is not limited to merely the success that it achieves in efficiency, but also success in positively changing the nature of work activities.

b. Organizational studies

Most studies of this type have assessed the **perceived** impact of electronic communication technology on job performance within organizations. The emphasis is on perceived impact because studies to actually measure such changes, particulary if all three levels of technological impact discussed by Kiesler were measured, would have to be extremely long term.

Some good examples of perceived impact of electronic communication technology are illustrated in a survey of 94 Fortune 500 companies conducted by Hellweg [Ref. 2:p. 12]. Corporate representatives were asked to respond to the possible effects of the introduction and growth of electronic communication systems into their organizations. The performance factors to be evaluated and the corporate responses are listed in Table 2.4.[Ref. 2:pp. 1-22]

TABLE 2.4
PERCEIVED EFFECT OF ELECTRONIC COMMUNICATION TECHNOLOGIES

Performance Attribute	Perceived Impact
Employee productivity	Increase
Employee job satisfaction	Slight increase
Dissemination of information	Increase
Information retrieval capability	Increase
Time management capability	Slight increase

In addition to the perceptions towards performance impact, corporate respondents were asked to assess the apprehensiveness of their organizations towards the introduction of electronic communication technology. The respondents indicated that their organizations would be:

* Slightly apprehensive about learning the new technology.

* Slightly apprehensive about the change to the new technology.

* Slightly apprehensive because the technology was perceived to be a threat to job security.

* Slightly apprehensive because of the potential for reduced interpersonal contact.[Ref. 2:p. 15]

Hellweg concludes by noting that even though electronic communication increases the productivity of workers, there is a need to monitor the dynamics of human interaction in order to maintain the personal qualities of organizational life [Ref. 2:p. 17]. The dynamics of interaction discussed by Hellweg are the subject of the following two sections.

c. Technical Capabilities

Research in this area is extremely important to the both the sellers and buyers of electronic communication systems. Identification of hardware and software features which promote or enhance the use of these systems is critical to their acceptance and ultimate success. As stated by Hiltz and Turoff, "The intimate role that the user plays in these systems means that the user expectations, desires, wishes, and reactions have to be given extremely serious consideration by the designers".[Ref. 10:p. 378]

Although analysis of particular hardware or software features are not the major concern of this thesis, their effect on usage and potential effectiveness when considered as whole is worth further discussion. A study using this type of perspective was conducted by Steinfield [Ref. 5].

Steinfield investigated perceived channel attributes as one potential predictor of electronic mail usage for both task and non-task use. Steinfield characterizes perceived channel attributes as the following:

- Perceived utility --The expectations about the effectiveness of using a channel.
- Ease of use --The friendliness of the computer interface.
- Perceived social presence --The degree to which those being communicated with are perceived as "real" people.
- Perceived privacy --The degree of privacy afforded by electronic mail.[Ref. 5:pp. 34-42]

Steinfield surveyed 220 e-mail users from a large office products vendor. He found that of all perceived channel characteristics, perceived utility showed a significant relationship with **task** usage. The other factors showed zero order correlations but Steinfield felt that these factors contributed to perceived utility.

This finding is particulary useful to this thesis. Perceived utility as defined by Steinfield is in essence perceived effectiveness. Based on Steinfields' findings, e-mail will not be used for task oriented communication if the e-mail is not perceived as being effective. It is also important to note that perceived utility is not determined solely by the characteristics of the of the medium. Perceived utility as defined by Steinfield could be affected by organizational policies, personal perceptions towards the medium, and past experiences in terms of effectiveness.

d. Social Psychology Research

This research area has focused on how computer-mediated communication affects organizational behavior. Most of these studies have investigated how several unique characteristics of electronic mail impact group interactions. Researchers have been concerned that electronic mail may weaken social context cues and feedback found in other organizational communication mediums [Ref. 6:p. 1497]. A discussion of social context effects on communication and the results from some research in this area are presented below.

(1) Social Context and Communication. Communication flow within an organization is affected by social context. Social context regulates or influences who is communicated with by whom and what information is passed. Social context influences information exchange through perception, cognitive interpretation, and communication behavior.[Ref. 6:p. 1494]

Factors which affect perception of social context include geographic location, organizational position, and situation. Situation variables include personal attributes of the parties involved in the communication, the relationship that exists between them, the topic of the communication, and the norms of the organization.

These factors are perceived through static and dynamic cues. Examples of static cues are a letterhead indicating that a communication is from the president's office, or the tradition that the chairman of the board sits at the end of the conference room table. Examples of dynamic cues include nods of approval, a person sleeping while another is talking to a group, or a person whose face indicates extreme displeasure.[Ref. 6]

By perceiving and interpreting the social context of a situation, a person will adjust his/her communication behavior. A good example is that a crude joke is generally not communicated during a corporate board meeting but would be considered quite acceptable in a men's locker room.

Thus, the ability of a medium to present context cues is extremely important to an individual's communication behavior. Very little research has been done to assess the what characteristics of mediums affect the transmission of context.

(2) Electronic Mail and Social Context. Face to face communication is the medium which provides the optimum amount of social context cues. All other communication mediums in one way or another diminish the amount of static or dynamic cues available. Of all communications mediums available for organizational communication, electronic mail has the potential to provide the least amount social context cues.

Telephone communication reduces both static and dynamic cues by removing visual information. Letters and memorandums provide some static cues such as letterhead, standardized formats, handwritten notes in margins, and a signature but they provide no dynamic cues. Electronic mail may provide the least amount of cues. Dependent on the e-mail system software, static cues normally provided by text based media (letterhead, signatures, special formats) may not be able to be transmitted. And like letters and memorandums, dynamic cues are not provided. [Ref. 6:p. 1496]

The concern of social researchers is that the loss of social context cues and the lack of norms governing e-mail's use may affect communication in the following ways:

- Lack of social feedback and unpredictable style may make messages difficult to coordinate and comprehend.
- Social influence among communicators may become more equal because the hierarchial and power information is not transmitted.
- Social standards will be less important. Communication will be more impersonal and users less cognizant of the social situation surrounding the communication encounter.[Ref. 8:p. 1126]

Although there is general agreement that the above communication affects have potential impact of e-mail, there is no consensus among researchers on how these three factors will influence the **effectiveness** of various groups facing various tasks. There is very little experimental research focusing on group behavior where electronic mail is a primary communication channel [Ref. 8:p. 1127].

(3) Research Findings. In this section the findings from two research studies on the behavioral impacts of computer mediated communication are presented. The results of these studies tend to support the hypothesized effects of diminished social context cues discussed in the previous section.

(a) Group Processes. A 1983 study conducted by Siegel, Dubrovsky, Kiesler, and McGuire [Ref. 12] investigated the effect of computer mediated communication on communication efficiency, group participation, interpersonal behavior, and group choice. Measures of communication efficiency were the time to reach decision, number of remarks made, and percentage of remarks that focused on the task.[Ref. 8:p. 1128]

A group decision problem was first run using face to face communication. The same problem was then run using computer conferencing as the only group communication method. The experiment was conducted at a research facility. The results were as follows:

* Communication efficiency. When compared to face to face groups, computer mediated groups took longer to reach consensus, exchanged fewer remarks, were as task oriented, and submitted more decision proposals.

* Participation. Group members participated more equally in the decision making process when computer communication was used.

* Group Choice. Computer mediated groups showed significantly higher choice shifts.

* Interpersonal Behavior. People in computer mediated groups exhibited a higher degree of uninhibited behavior. Behavior such as swearing, insults, and hostile remarks were used for measurement of this variable. [Ref. 12:pp. 180-184]

(b) Organizational experiment. A field study conducted by Sproull and Kiesler [Ref. 8] further validated the hypothesized effects of reduced social context. The study was conducted in a research unit of a large Fortune 500 office equipment firm which had a well established electronic mail system. The findings of this field study are listed below:

* Electronic mail provided weak social context cues.
* People were more self absorbed in their communications.
* Messages from superiors looked no different than messages from subordinates.
* People preferred to send messages via electronic mail to their superiors than to their subordinates.
* People behaved more irresponsibly when using e-mail as compared to face to face oral communication.
* People preferred to send bad news via e-mail.
* 60 % of the messages contained information that people felt they would not have received without e-mail.
* People used e-mail for non-task related communication.

D. IMPLICATIONS OF RESEARCH TO THIS STUDY

Most of the research on electronic mail has focused on factors relating to efficiency, use, and behavioral impact. This research is important in understanding how electronic mail may affect the communication processes, but does not provide much insight on the overall effectiveness of the medium. Again, this is probably related to the difficulty in gaining access to organizations using e-mail and physically measuring what is determined to be effectiveness. This study intends to address this gap in the research.

The information and findings discussed in the previous sections all have bearing on the effectiveness of electronic mail as an organizational communication system. What is needed is a methodology to draw this information together and develop a unique measure of effectiveness. This study will draw from all research areas to develop a measure of perceived effectiveness.

III. ELECTRONIC MAIL EFFECTIVENESS

A. INTRODUCTION

This chapter discusses electronic mail effectiveness and introduces the concept of perceived effectiveness.

First, a broad discussion on effectiveness is presented. Based on this discussion, electronic mail effectiveness is defined based on Thayer's multi-perspective viewpoint of effectiveness; also criteria for analyzing effectiveness within these perspectives are identified. Last, perceived effectiveness is defined and its importance is discussed.

B. EFFECTIVENESS OVERVIEW

> How the organization produces its written communications is very important. If the production methods are inefficient, the firm will expend unnecessary monies and resources. If they are ineffective, these production methods and outputs may lead to such serious dysfunctions as equipment and materials being used for the wrong ends, or, the right purpose but the wrong result syndrome. An ancillary damage can be the creation of severe human dissatisfaction both inside and outside the company. [Ref. 13]

As the above quotation indicates, communication system efficiency and effectiveness are distinct qualities having very different effects on organizational performance. As shown in Chapter II, the bulk of research on electronic mail has discussed the efficiency of this medium; relatively few studies, though, have addressed its effectiveness. In all likelihood this focus on efficiency has occurred because effectiveness is difficult to define and even harder to analyze.

1. Effectiveness Defined

Efficiency means "doing things right", and effectiveness means "doing the right things." [Ref. 14] From a business standpoint, a process is efficient when a goal is achieved and a minimum amount of resources have been used. Effectiveness, though, is a far-reaching quality; it is the degree to which the goal and efficient process contribute to the overall success (in the economic as well as in the human resource management sense) of the organization.

The major problem with this definition of effectiveness is that it is rather open ended. The degree to which a process is considered effective can vary depending on the situation and perspective it is viewed from. Thus, the determination of effectiveness can be very complex because of the large number of situational factors and contingencies that determine effectiveness.

To clearly illustrate how effectiveness can vary depending on situational factors, the following example is provided. A technical report describing the advantages of a new office automation system could be effective for one group of readers but ineffective for another. Readers in the organization's information systems department may have no difficulty understanding the specialized language and unique syntax of the report. Furthermore, their perception of office automation may be very positive, and, as a result, they may view the report as a non-sensitive document. On the other hand, readers, say, in the Human Resource Management department may have difficulty understanding the technical language of the report and unravelling the compacted syntax often characteristic of information system specialists. Furthermore, they may view the report as extremely sensitive because of employees' possible resistance to widespread introduction of new technology and the resulting morale and motivation problems that may occur. Consequently, because of a variety of situational factors caused by the different readers of the report and their different perceptual sets, the same report with the same content is effective with one group but ineffective with another.

2. **Perspectives**

The effectiveness of an organizational communication system can be viewed from a variety of perspectives. Each perspective will measure the effectiveness of the system against different criteria and from a different set of organizational assumptions.

Thayer states effectiveness should viewed from four perspectives--the intrapersonal, interpersonal, organizational, and technological--which are discussed below[Ref. 15]. To simplify discussion, intrapersonal and interpersonal are combined into one category--personal effectiveness. Within each perspective, four potential criteria for measuring the degree of effectiveness are described. Obviously many more criteria could be included to evaluate effectiveness from each perspective.

a. Organizational perspective

The organizational perspective views the communication system from the standpoint of its appropriateness to the organization. Evaluation criteria could include these questions:

- Is the system compatible with the organization's tasks?
- Is the system compatible with the organization's rules and policies?
- Does use of the system fit the norms of the organization?
- Does the system support the organizations communication patterns?

b. Personal perspective

The personal perspective assesses the system from the viewpoint of an individual within the organization. The extent of the communication system's effectiveness is compared with what the individual feels is the best system for him/her to complete job tasks and maintain human relations needs. Criteria could include:

- The degree of satisfaction the individual gains from the system.
- The desire and capability of the individual to use the system.
- The ability of the system to satisfy the individuals formal and informal communication needs.

* The ability of the system to help the individual accomplish his/her assigned tasks.

c. Technological perspective

The technological perspective is concerned with the equipment, apparatus, and the formalized programs for generating, storing, processing, translating, distributing, or displaying data. [Ref. 15] Criteria for evaluation include:

* The methods by which communications are presented to the receiver. For example, letters are delivered in hard copy, phone communications aurally, face to face communications both visually and aurally.

* The speed with which communications are routed.

* The reliability of the system.

* The user friendliness (merely from a technical standpoint) of the system.

Thayer states that although analysis on the technological level in and of itself is important, the technological perspective interacts with the both the organizational and personal level in determining communication system effectiveness. [Ref. 15]

3. The Difficulty in Analyzing Effectiveness

Defining and analyzing effectiveness is much more difficult than assessing efficiency. This difficulty results from numerous perspectives that effectiveness can be viewed from, the qualitative nature of effectiveness analysis, and the large number of potential criteria needed to assess effectiveness from each perspective.

Consequently, when an organization faces an efficiency and effectiveness issue, the complexity of effectiveness analysis may force the organization to rely on solely efficiency analysis to determine whether to implement a new communication system. A good example of this is the DEC study that was presented in Chapter II.

The DEC study clearly demonstrates the cost efficiency of e-mail through a detailed technological and financial analysis. But analysis from this perspective alone does not ensure effectiveness. The DEC study did not assess e-mail's potential impact and associated human costs from both the organizational and personal perspectives. For example, DEC researchers did not determine if:

* e-mail will cause communication overload.
* e-mail will satisfy personnel's feedback and interpersonal communication needs.
* e-mail will level the perception of hierarchial differences between superiors and subordinates.

To identify and capture data on all potential attributes of effectiveness would require a long term study. Criteria from each perspective would have to be developed, weighted for degree of effect, and integrated to develop an overall measure of effectiveness. Measurements would have to be taken prior to system implementation and then again after the transient effects discussed by Kiesler [Ref. 12] have subsided. Then follow up research would be necessary to determine the communication systems long-term impact on the different effectiveness perspectives. Therefore, it is not surprising organizations, such as DEC decide to implement systems like e-mail based on efficiency measures alone. Obviously such decisions are made with some risk. The actual improvements in effectiveness may be marginal because of negative impacts from effectiveness perspectives not considered in the analysis.

Despite the inherent complexity, organizations must to some extent assess this quality to determine the human relations impact of a new communication system on its users. One method to reduce the difficulty of assessing new system effectiveness is to limit the perspectives and evaluation in each of the effectiveness perspectives. Although this method may not capture all the variables that contribute to an assessment of effectiveness from each perspective, it can result in a measure which provides a good overview of system effectiveness and that can be correlated with time and cost efficiency research. This study will addresses the effectiveness of electronic mail by carefully limiting the evaluation criteria in each of Thayer's perspectives of effectiveness. And, as the next section explains, the concept of **perceived effectiveness** will be used to further refine the definition of effectiveness.

C. PERCEIVED EFFECTIVENESS

This section defines the concept of perceived effectiveness as a measure of organizational communication system effectiveness.

1. Definition

Perceived effectiveness is very similar to the measure of perceived utility used by Steinfield in his studies on e-mail usage. Steinfield defined perceived utility as the expectation of effectiveness from using the e-mail channel to communicate information. The perceived effectiveness of a communication system is similar, it is the degree to which people "feel" the system will useful in carrying out their tasks. An example of how perceived effectiveness can affect the choice of channel is given below.

A manager wants to communicate an instruction of importance to a subordinate who is located in an office three floors below. The manager can either call the subordinate, send him a memo, or personally give the order. The manager assesses the effectiveness of each channel based on a range of factors such as the communication channel customs of the organization and the functional area, the manager's confidence and skill in using the different channels, the history of prior communications with the subordinate, the amount and type of feedback each channel will provide, and the relative sensitivity of the message. He then selects a channel based on his perception of how it satisfies these and other factors rather than on clear cut objective assessment of the channels's relative strengths and weaknesses

2. Importance of Perceived Effectiveness

Short, Williams, and Christie state that perceived effectiveness might well be more important than objective effectiveness in the selection of communication channels [Ref. 16:p. 164]. This statement is supported by Steinfields' identification of a positive relationship between perceived utility and task use [Ref. 5]. Thus, even if a system is effective from an objective, efficiency standpoint, a more inclusive measure of effectiveness is the degree to which the system is perceived to be effective by the system users.

Perceived effectiveness can also be viewed from the multi-perspective assessment that Thayer has provided. System users may perceive a communication system as being very effective from the technical perspective, but perceive it as being very ineffective from organizational and personal perspectives. Thus, the perception of effectiveness from all perspectives could be an important determinant of the adoption and success of any communication system.

3. Using Perceived Effectiveness as a Measure

The measurement of effectiveness has been shown to require a complex, multi-perspective research design. Furthermore, user **perception** of these measures of multi-perspective effectiveness must be captured determine if the communication system will meet the users' task and human relations needs. Consequently, this study will use perceived effectiveness to determine e-mail effectiveness. However to reduce the complexity inherent in measuring effectiveness as well as perceived effectiveness, the criteria which define Thayer's perspectives of effectiveness is limited to the following items.

a. Technological

- Ability to communicate with others within area of specialty and outside area of specialty
- The ability to send various types of correspondence via e-mail
- Reliability of e-mail
- Ability of e-mail usage to reduce travel and number of meetings
- Ease of use
- Efficiency of reading messages on computer screen versus hard-copy

b. Organizational

- Degree of change the use of e-mail represents
- Organizational resistance to the use of e-mail
- Ability of e-mail to provide decision makers with more information and improve decision making
- The degree to which the use of e-mail is promoted within the organization
- The compatibility of e-mail use with organizational communication rules

c. Personal

- Desire to use e-mail over other correspondence methods
- Degree to which personnel liked using and were comfortable with e-mail
- Ease of use
- The ability of e-mail to make job easier

The criteria in each effectiveness perspective category were chosen because they reflect e-mail issues most organizations would have to assess in order to determine if its e-mail, or any other communication system, is effective. Also, these issues were felt to be relevant to U.S. Coast Guard Headquarters, the organization being assessed in this study.

The next chapter discusses the development of a survey instrument used to measure perceived effectiveness.

IV. DESIGN OF STUDY

A. OVERVIEW

United States Coast Guard (USCG) personnel, both military and civilian, were targeted for survey to determine if:

- electronic mail was perceived to be significantly different from other organizational communication channels.
- electronic mail was perceived to be an effective communication channel from a personal, organizational, and technological perspective.

The following sections discuss the survey instrument and procedures developed to answer these questions.

B. SURVEY INSTRUMENT

The survey instrument consisted of four distinct sections. These sections were:

- electronic mail/message attitude instrument consisting of 18 pairs of bipolar adjectives on a seven point Likert scale
- 28 closed ended questions, on a seven point Likert scale, measuring perceived effectiveness of electronic mail from a technological, organizational, and personal perspective
- background information questions
- open ended question to allow for personal comments

The complete survey instrument is presented in Appendix A.

1. Electronic Mail and Message Attitude Instrument

This instrument consisted of 18 bipolar adjectives on a seven point Likert scale. The instrument was designed to assess and compare perceptions of survey participants towards e-mail and record messages. The purpose of this instrument is to determine if participants perceived the two channels as being significantly different.

Bi-polar adjectives were chosen to reflect attributes of the channel related to the personal, organizational, and technical perspectives. For example, two of the adjectives relating to the personal perspective were PLEASANT and UNCOMFORTABLE. Attributes from the technical perspective included RELIABLE and EFFICIENT. Organizational attributes such as FORMAL and OFFICIAL were selected for measurement.

The instrument design is similar to an instrument used by Steinfield [Ref. 5:p. 83] for measuring perceived channel characteristics. Steinfields' instrument focused more on the technical and personal characteristics of the channel.

2. Perceived Effectiveness Instrument

This survey section listed 28 statements related to electronic mail effectiveness. The statements were developed to reflect effectiveness from each of the perspectives discussed in Chapter II.

Participants were asked to respond to the statements by indicating the extent to which they agreed or disagreed with the statement. Responses were measured by using a 7 point scale where a neutral response was considered a rating of 4.

Examples of statements relating to personal, organizational, and technical perspectives respectively, are listed below:

- using electronic mail to send most of my correspondence makes me feel uncomfortable (personal)
- the CG promotes the use of e-mail (organizational)
- I believe e-mail is a reliable method of conveying information to its intended receiver (technical)

The results from this section of the survey are used to determine the degree to which respondents perceived e-mail as being an effective means of communication. The perceptions will be analyzed by perspective to determine if a particular perspective is a dominant force in determining perceived effectiveness.

3. Background Information

This section was to collect demographic and communication activity data about the respondents. Questions in this section sought to gather data on the following:

- use of various mediums for transmitting information
- percentage of communications received by various mediums
- degree of electronic mail usage
- age, gender, rank/grade, department affiliation

This information will be used to determine if any of these variables significantly affect perception towards and perceived effectiveness of electronic mail

4. Open Ended Question

The survey provided an open ended question to allow respondents to express any attitudes or feelings towards electronic mail. The purpose of this question was to:

- capture any perceptions not addressed by previous sections
- allow for detailed comments on any aspect of e-mail the respondent had strong feelings about

Respondents were also asked to provide information on what types of correspondence they felt should be sent via electronic mail. The purpose of this question was to identify the types of correspondence respondents perceived electronic mail could transmit.

C. SURVEY RESPONDENTS

Survey respondents were chosen from USCG Headquarters, Washington D.C. This site was selected because of:

- access to a large number of respondents within one location
- exposure of most respondents to e-mail systems
- high level of communication activity
- existence of a good cross-section of USCG personnel

This section describes demographic variables and discusses limitations encountered.

1. Respondent Demographic

a. Military/Civilian, Rank/Grade, and Age

Headquarters (USCGHQ) was the best location to conduct the survey because of the existence of an excellent cross-section of USCG personnel. Of the 2215 people assigned to USCGHQ, approximately 70% are military; the remaining 30% are civilian employees. The ranks of military personnel range from Seaman (E-3) through Admiral (O-10). Civilian personnel range from government service/management (GS/GM) grade 5 (GS5) through GS/GM15. In general, the age of the respondents increased with rank.

A cross-section of this nature was important in determining if perceptions toward e-mail were affected by the above demographic considerations.

b. Occupational Specialty

Personnel at USCGHQ are employed in a wide range of occupational specialties. USCGHQ is divided into divisions based on function. For example, personnel responsible for the management of USCG communication and electronics equipment are grouped into the Office of Command, Control, and Communications (G-T). Other divisions focused on procurement, marine safety, operations and so on.

It was desirable to survey across the divisions to determine the impact of this variable on perception. Unfortunately, access to respondents in divisions other than the G-T was limited. This must be considered a limitation since personnel assigned to G-T are very familiar, and in general comfortable, with new technology.

2. Communication Activity and Electronic Mail

The survey sought to gather information on communication channels used by the respondents. The purpose of this investigation is to determine if the degree of use of a particular channel had any effect on perception of e-mail. Unfortunately a flaw in the survey design confused respondents and made the resulting data somewhat questionable.

The survey requested respondents identify if they were e-mail users, and if so, list the number of business related messages they sent each week. This data was considered to be extremely relevant to determining the respondents perception towards e-mail. The expected finding was that high users of e-mail perceive it as being more effective than low users.

Many respondents were users of an electronic mail system called CT-Mail. The system is part of the software package for a desktop computer system known as the Coast Guard Standard Terminal. Use of the Standard Terminal is prevalent throughout the USCG, and the number of personnel using CT-Mail to communicate is rapidly increasing.

The survey sought to measure perceptions toward electronic mail in general, not toward any particular type of e-mail system such as CT-Mail. Since most respondents were users of CT-Mail, it is highly likely their perceptions were influenced by their experiences with this particular system.

To minimize this effect, respondents were asked to not base their responses on any particular type of e-mail system. Although this instruction may have eliminated some respondent bias, the extensive use of CT-Mail by most respondents affected their responses to the survey instrument.

D. EXPERIMENTAL SETUP

Participation in the survey was encouraged but not required. A memorandum from the Deputy of the Office of Command, Control, and Communications was attached to each survey (See Appendix B). The purpose of the memorandum was to establish credibility and motivate respondents to complete and return the survey. The survey was designed to be self administered.

1. Participants Divided Into Groups

The participants were divided into two groups, hereon referred to as the e-mail group and the message group. The e-mail group received the e-mail attitude and e-mail effectiveness instruments. The message group received the message attitude and e-mail effectiveness instruments.

All personnel within a particular office were placed in the same group. This was done to avoid confusing participants and to make survey collection easier. Care was taken to ensure the two groups were similar demographically.

2. Distribution of Surveys

Survey forms were provided to office supervisors after receiving a short briefing on the purpose of the study.

Supervisors then distributed forms to personnel within their office and designated a location where completed forms were to be returned. Supervisors were asked to encourage personnel to complete the survey within 48 hours.

TABLE 4.1
E-MAIL SURVEY DEMOGRAPHICS

Age	Percentage
30 Yrs or less	10.5
30 to 40	54.0
40 to 50	27.5
50 Yrs or more	8.0

Rank/Rating	Percentage
E1-E9	2.6
GS4-GS9	10.5
GS/GM10-15	31.6
W1-W4	5.3
O1-O3	21.0
O4-O9	29.0

E- Enlisted GS/GM- Government Service/Management
W- Warrant Officer O- Commissioned Officer

Office	Percentage
Communications	68.4
Acquisition	18.4
Operations	2.6
Marine Safety	9.3
Other	1.3

Number E-Mail Msg Sent/Wk	Percentage
Not a user	11.8
1-10 messages	56.6
10-20 messages	18.4
20-30 messages	7.9
30-40 messages	4.0
More than 40	1.3

3. **Survey Response Rate**

100 surveys were distributed to e-mail group personnel. 70 surveys were distributed to message group personnel.

76 surveys were collected from the e-mail group, representing a 76% return rate. 32 surveys were returned from the message group. This represents a 46% return rate. It is not known why the message group had a significantly lower return rate.

E. SUMMARY OF DEMOGRAPHICS

Table 4.1 lists the demographic data of the e-mail group; the demographics of the message group were similar. As indicated in Table 4.1, the typical respondent can be characterized as an upper level manager, age 30 to 40, working in the Office of Command, Control, and Communication, who sends between 1 and 10 business messages a week via electronic mail.

F. METHODS OF ANALYSIS

Data from completed surveys was coded and entered into a database system and a general purpose statistical computing system. The two packages used to analyze survey data was DBASE III+ and Minitab [Ref. 17].

Responses to the e-mail/message attitude survey and e-mail effectiveness were analyzed independently. Specific methods of analysis included:

* Mean, mode, and standard deviation summaries
* T-Interval (95% confidence)
* Correlation
* Paired T-test
* Multiple variable regression

The next two chapters discuss the analyzes the responses of survey participants to the attitude and perceived effectiveness instruments.

V. PERCEPTION OF CHANNEL

A. OVERVIEW

This chapter analyzes responses to the e-mail and message perception instrument. The purpose of this instrument was to determine if there existed significant differences in perceptions towards e-mail and record messages. Mean response and T-intervals (95% confidence) were calculated for each perception. Then, T-tests were used to determine if there were statistically significant differences in perceptions between the e-mail and record message channels.

In addition to determining the difference in perception between channels, perceptions towards e-mail are analyzed based on demographic variables. Due to the large amount of data gathered, only the most significant results from the demographic analysis are presented. The perceptions of the following demographic groups are compared with each other:

- officer personnel and civilian/enlisted
- high e-mail users and non e-mail users
- G-T personnel and non G-T personnel
- personnel younger than 40 and those 40 and over

B. PERCEPTIONS OF E-MAIL AND RECORD MESSAGES

Table 5.1 presents the mean response to each of the bi-polar adjectives for e-mail and record messages. The statistical significance of the difference is also presented.

The means and significance are based on the responses from all participants in the e-mail and record message groups.

TABLE 5.1
MEAN RESPONSES TO E-MAIL AND MESSAGE
PERCEPTION SURVEY

Perception	E-Mail	Message	Significance
Professional	2.5	2.4	.66
Sociable	3.5	4.4	.01
Inefficient	5.2	4.6	.12
Helpful	2.6	3.0	.18
Informal	2.1	4.8	.00
Readable	2.0	3.2	.00
Satisfying	2.8	3.5	.01
Influential	3.2	2.5	.00
Hard to use	5.2	4.0	.00
Confidential	5.3	4.9	.36
Time saving	2.4	3.4	.01
Appropriate	2.6	3.6	.01
Uncomfortable	5.4	4.3	.00
Reliable	3.6	2.6	.00
Pleasant	3.4	3.8	.17
Inhibiting	4.7	3.9	.02
Valuable	2.2	2.6	.13
Official	3.4	2.2	.00

1. Perception of channel

As Table 5.1 indicates, respondents perceived the e-mail and record message channels as being significantly different in many aspects at very stringent levels of significance. Results considered of interest to this study are discussed below.

a. Sociable - Unsociable

Respondents felt that e-mail was more sociable than record messages (mean of 3.5 versus 4.4) at a significance level of .01. This response was expected for several reasons.

First, e-mail users directly interface with the e-mail system. Users create, transmit, and receive communications at their own computer terminal. Furthermore, communications are delivered directly to and received from other e-mail users' computer terminals.

In contrast, record message users do not directly interface with the message system. Outgoing messages must be delivered to and incoming messages received from the Headquarters communications center. Receivers and senders at the destination/origination must interface with the communication center at their location. Thus, e-mail users feel as if they are part of the e-mail system and have a more direct and personal interaction with others than record message system users.

Secondly, e-mail can be used to send both task oriented communications and social information; the record message system is strictly for official task purposes. During field trips to collect survey data, the author asked several personnel to display their e-mail inbox. In many cases approximately a quarter of the personnel's messages related to non-task social information.

Kieslers' discussions on social context must also be considered a factor in this perception. As stated by Kiesler, people adjust their communication behavior based on their perception of social context cues. Strong context cues results in very regulated behavior; weak cues result in unregulated/uninhibited behavior. Kiesler's research has shown that electronic mail provides relatively weak social context cues[Ref. 5:p. 1497]. This is particular true for USCGHQ e-mail users because:

* e-mail messages contain little hierarchial position information such as rank or office, last and first initial are currently used as an addressing method

* there does not exist any specific organizational rules on formats that e-mail messages are to be prepared in

* e-mail messages are delivered from sender to receiver without being seen by intermediary personnel

* e-mail users do not generally have to receive approval from their supervisors before sending e-mail messages.

The above attributes of the USCGHQ e-mail system all contribute to reduced social context cues, and thus users of e-mail perceive the system as allowing them to be more sociable, especially when the compared to the record message system.

Record message users must prepare the message in accordance with organizational rules, receive approval from a releasing authority, and route the message to the receiver via intermediary personnel in communications center. At each stage of the communication process the message system user receives reminders of social context; some of the context cues are very strong, for example, having to receive approval from a supervisor. Because of the strong social context cues presented during use of the message system, users may feel that the system is somewhat unsociable.

b. Informal - Formal

Respondents classified e-mail as be significantly less formal (mean of 2.1 versus 4.8, .00 significance) than record message. This result is not surprising since at the time of this study e-mail had not been approved as a method to send formal correspondence. Since the survey, the USCG has developed an organizational directive approving the use of e-mail for all types of official correspondence except sensitive or classified information. The USCG is one of the first government agencies to establish such a policy.

Although organizational regulations probably are a major contributor to the perception of formality, factors such as the social nature of e-mail, as discussed in the previous section, may reinforce this perception of informality. Since e-mail can be used to send non-task information and lacks the social context cues the organization places on the message system, users perceive it as being informal from an organizational perspective.

c. **Readable - Hard to Read**

Respondents perceived e-mail messages as being much easier (mean of 2.0) to read than record messages (mean 3.2) with significance of .00. Again, this finding is expected.

The formats and language used for record messages do not reflect plain language. There is extensive use of acronyms, atypical syntax, and cluttered, visually unappealing formats. These limitations exist because record messages are expensive to transmit/receive and the record message system is generally at full capacity. Another reason record messages may be perceived as hard to read is due to poor copy quality; personnel generally receive a Xerox copy of the original message received at the communication center.

E-mail messages may be more pleasing to read than record messages because e-mail message formats are flexible, brevity is not required, and the language used may be more conversational. Also, e-mail messages are delivered directly to the user's computer terminal screen. The user can read the message on the screen or send the message to a printer if he desires hard copy. The quality of print on most computer screens and printers is generally much better than the print quality of Xeroxed record messages.

d. Satisfying - Unsatisfying

Personnel perceived e-mail to be more satisfying than record messages (mean of 2.8 versus 3.5, .01 significance). Although an important finding, it is difficult to identify which attributes makes e-mail more satisfying. This is possibly because the bi-polar, satisfying-unsatisfying, has the potential to capture attitudes from each of Thayer's perspectives. For example, the use of electronic mail could be very satisfying from the personal and technical perspective, but at the same time be unsatisfying from an organizational perspective. Thus, the degree to which the user perceives e-mail or record messages as being satisfying probably results from an integration of perceptions of satisfaction from each perspective; the more positive the perceived satisfaction from each perspective, the more positive the overall perceived satisfaction.

Reviewing the responses to all bi-polars (Table 5.1), e-mail is perceived as being more positive than record messages from the technical perspective. This is indicated by the responses to the readable, time saving, hard to use, and inefficient bipolars. Furthermore, e-mail is perceived as being more positive than record messages from the personal perspective as indicated by the responses to the sociable, helpful, and uncomfortable bi-polars. Also, e-mail is perceived as more negative than record messages from the organizational perspective as indicated by the responses to the official, influential, and informal bi-polars.

If positive responses to the bi-polars from each of the perspectives is considered an indication of the degree of satisfaction, then e-mail is perceived as more satisfying than record messages in both the personal and technical perspectives. Thus, when the perspectives are considered as a whole, users may perceive e-mail as being more satisfying than record messages.

e. Influential - Uninfluential

Record messages were perceived to be more influential or persuasive (mean of 2.5 versus 3.2, .00 significance) than e-mail. This result may be influenced by USCG organizational rules and the effects of social context.

Social context is very important when trying to persuade or influence people. The behavioral responses of an individual to a persuasive or influential message will be affected by the perceived social context in which the message is received in. Social context cues such as a lavish desk (static cue), a nameplate with C.E.O engraved under the name (static cue), dynamic cues like a stern look from the man behind the desk, and the social and organizational rules for behavior significantly influence the individuals behavioral response.

As discussed in previous sections, the USCG has established specific procedures and rules for the use of the record message channel. When a record message is received, the receiver can easily tell from what hierarchial level the message has been sent (static cue); the receiver also knows the process that the message had gone through prior to entering the record message system (static cue), for example message preparation rules and approval requirements. Thus, when persuasive and influential messages are received via the record message channel, receivers have social context cues and organizational rules on which to base their behavioral response.

Electronic mail as it currently exist in the USCG, does not have the degree of organizational regulation, nor the capability to carry social context cues as record messages. As stated in the previous section, the originators of e-mail messages are identified by only their last name and first initial. Thus, if the receiver does not know the originator, he must determine the hierarchial position of the originator by other means. The lack of organizational rules for use of the e-mail channel further reduce social context cues. For example, if there existed specific organizational rules which stated e-mail shall only be used to send formal task oriented communications, then communications received via e-mail would be perceived as more official (because of the rules) and thus more influential.

It is also interesting to note that e-mail is perceived as less formal, professional, and official than record messages. This finding may indicate the degree to which a communication system is perceived to be formal, professional, and official is related to the degree it is perceived to be influential, and vice versa.

The official, formal, influential, and professional bi-polars were selected to measure perceptions from Thayer's organizational perspective. It is possible that for e-mail to be perceived as more positive in the organizational perspective, USCG management must develop procedures or technical capabilities for the e-mail system to provide more social context cues. Also, management must consider development of organizational policy to guide the personnel's interpretation of the social context presented by e-mail and thus personnel's associated behavioral responses.

f. Hard to use - Easy to use

E-mail was perceived to be significantly easier (mean of 5.2 versus 4.0, .00 significance) to use than record messages. Interesting, respondents' perceptions towards record messages were distributed over a wide range (standard deviation of 1.9)-- some perceiving it easy to use while others found it hard, resulting in a neutral mean.

The hard-to-use bi-polar was designed to measure perceptions from Thayers' technical and personal perspectives. It is possible that many of the positive perceptions of e-mail from these two perspectives, such as readable and time-saving (technical perspective), and comfortable and sociable (personal perspective), are significantly influenced by users perception of ease of use. For example, if the system is perceived to be easy to use, the user may also perceive the system as saving time and being more comfortable. A relationship of this nature indicates ease of use is potentially a primary determinant of positive perceptions from both the technical and personal perspectives, and thus may have significant influence on the overall perception towards the system.

g. Time Saving - Time Wasting

Both e-mail and record messages were perceived to be time saving channels, but e-mail was perceived to be more so (mean of 2.4 versus 3.4, .01 significance). This perception probably results from the fact both channel transmit messages via electronic means, and thus are very rapid. But e-mail messages have the significant advantage of being created, transmitted, and received directly from the users computer terminal. Messages, as discussed above, must be handled by the communications center, thus adding more time to the overall process.

Another possible explanation for this perception is users may feel e-mail is **capable** of handling communication tasks which would have required more of the users time. For example, if the organizational rules permitted personnel to send formal correspondence, such as the types of correspondence handled by record messages, e-mail would most likely be considered the more time saving channel than record messages. This perception would occur because to send the information via record message the user would have to go through entire process described earlier; in contrast, the e-mail user simply enters the message into his computer terminal and sends it. E-mail also has the potential to provide the same degree of time saving if used instead of formal letters and memorandums.

An interesting consideration is that current USCG communication rules do not fully support the use of e-mail as a method of exchanging formal correspondence. Based on Thayer's perspectives, this lack of support could be considered a negative effect from the organizational perspective. Thus, even if respondents positively perceive e-mail as being time saving from the personal and technical perspectives, the negative influence from the organizational perspective, caused by the lack of organizational support, could possibly reduce the overall perceived time saving. It would be interesting to measure perceived time saving if USCG shifted policies and fully supported e-mail as a channel for sending all types of correspondence.

Although the effects from the organizational perspective may have reduced respondents perceptions that e-mail saves time, they still perceived e-mail as being more time efficient than record messages from the personal and technical perspective. This is possibly because e-mail can provide time savings in informal communication tasks. Responses to the open ended questions indicate e-mail users felt e-mail reduced phone tag and decreased the amount time spent in face to face meetings. Organizational rules do not allow record messages to be used for informal communication; thus, record messages could only be perceived as providing time savings for formal communication.

h. Comfortable - Uncomfortable

E-mail respondents perceived e-mail as being somewhat comfortable (mean of 5.4); message respondents had a neutral response (mean of 4.3) to this bi-polar. After reviewing comments made on the survey forms it became apparent that respondents were unsure of how to interpret and respond to this bi-polar variable. Interestingly, e-mail was considered to be more comfortable than messages at a significance level of .00.

The problem users may have had with the comfortable bi-polar, as well as several other bi-polars, is the bi-polar has the potential to measure user perceptions from each of Thayer's perspectives. Users could perceive e-mail as being very comfortable from the personal perspective; this is very possible considering the responses bi-polars such as sociable, satisfying, and easy to use. Furthermore, e-mail could be perceived as being comfortable from the technical perspective as shown by the responses to the readable and ease of use bi-polars. But, e-mail may be perceived as being uncomfortable from the organizational perspective. This could evolve from the fact that e-mail is perceived to be less official and less influential than record messages.

When all of the perspectives are considered together, the overall perception of comfortableness for e-mail is greater than that for record messages. This is perhaps an indication of the importance of perceived comfortableness of communication systems from the personal and technical perspectives.

i. Reliable - Unreliable

Both e-mail and record messages were perceived to be reliable channels (mean of 3.6 versus 2.6); however, record messages were perceived to be significantly more reliable (significance of .00). What is particulary surprising in this finding is the degree both channel were perceived as being reliable.

In practice the record message system has in general been very reliable from a purely technical perspective; therefore, it was expected that users would immediately recognize this fact and respond accordingly. The message groups mean response to the reliable bi-polar was 2.6, indicating record message users perceived the record message system to only be somewhat reliable.

It is possible that record message respondents were not perceiving reliability from just the technical perspective, as this study intended this bi-polar to measure, but the reliability from the personal and organizational perspectives also. The reliability of a communication system may be perceived to be more than just the successful delivery of a message to its intended destination. It may also include the likelihood that the message is sociable and satisfying (personal perspective) as well as official and influential (organizational perspective) to the intended receiver.

Despite the possibility that e-mail is does not provide the reliability of record messages from the technical and organizational perspectives; respondents perceived e-mail as only being slightly less reliable (difference of 1.0) than record messages. This finding may indicate the relative strength of reliability as perceived from the personal perspective.

j. Inhibiting - Uninhibiting

E-mail was perceived to be less inhibiting than record messages (mean of 4.7 versus 3.9, .02 significance). This finding correlates with the results from experiments conducted by Kiesler, Seigel, and McGuire [Ref. 7].

Kiesler's experiments showed e-mail users demonstrated more uninhibited behavior using e-mail for problems solving than when using face to face communication.

The behavior was attributed to the depersonalized nature of e-mail communication and the lack of context cues such as hierarchial position information. The non-existence of any specific etiquette and rules for using e-mail were also cited as possible explanation for uninhibited behavior [Ref. 7].

Kiesler's discussion has some relevance to the results of this study. As discussed in the sociable-unsociable section, the USCG e-mail system does not provide the same degree of social context cues as record messages. Thus, communication behavior is likely to be more uninhibited. Also, record messages are perceived as more inhibiting than e-mail because the organization has specific rules as to the content, procedures for use, and format of communications being sent over this channel. E-mail is not perceived as being inhibiting because of the lack of strong organizational policy for this channel.

Attributes from the personal and technical perspective cannot be ruled out as determinants of this significant difference in perceptions of channel inhibition. Unless an e-mail message is shown or forwarded to others, the only two people involved in the communication process are the sender and the receiver. This fact can foster a feeling of privacy and encourage openness. This situation is different from the record message system where a message has the potential to be seen by many people before it is delivered to the designated receiver.

k. Official - Unofficial

Record messages were perceived to be significantly more official than e-mail messages (mean of 2.2 versus 3.4, .00 significance). This is to be expected since the message system is the primary method for conveying official organizational communications. A neutral perception of e-mail may indicate respondents were unsure of their perceptions toward e-mail in this category. Or, this neutral e-mail perception could result from factors such as:

* lack of specific organizational policy on officialness of e-mail
* perceptions of channel officialness may depend on the type of message (task or non-task) and the situation

2. Summary of perceptions towards channels

The results of the attitude survey show perceptions toward the e-mail and record message channel are significantly different. As discussed in the survey design section, each bi-polar was selected to represent one of Thayer's effectiveness perspectives. When the responses are analyzed on this basis the following results become apparent:

a. Technical perspective

E-mail is perceived as being more positive than record messages from the technical perspective. Examples are the responses to inefficient, readable, and time saving bipolar adjectives. The only response that did not correlate is reliability. This result may have occurred because of technical reliability problems with CT-mail and because reliability may be perceived from the personal and organizational perspectives.

b. Personal perspective

E-mail is perceived to be more positive from a personal perspective. The bi-polars selected for the personal perspective (helpful, satisfying, and uncomfortable) showed significantly more positive responses than record messages.

c. Organizational perspective

The organizational perspective is where e-mail showed more negative responses compared to record messages. Bi-polars such as official, influential, and informal demonstrated that e-mail is perceived as being weaker in these areas.

d. Overall summary

These findings indicate e-mail users view the system positively from a personal and technological perspective. But there exists some negative perceptions towards e-mail from an organizational standpoint. When all of the perspectives are viewed as a whole, it appears that e-mail is perceived more positively than record messages.

The other interesting finding is that bi-polars selected to represent a single perspective appeared to be affected by perceptions from the other perspectives. For example, responses to the comfortable, time-saving, influential, and satisfying bi-polars demonstrated this effect. Respondent comments written next to these bi-polars also provide credibility to this explanation. There were several surveys where the respondents wrote comments next to the bi-polars such as "in what way?" or "depends on the situation".

The following section continues this analysis by investigating the effects of demographics.

C. DEMOGRAPHIC ANALYSIS

This section analyzes findings where there existed statistically significant differences in perception of e-mail as a result of demographic variables. Table 5.3 presents those perceptions that showed a significant difference as a result of demographic variables.

1. High versus non users

As indicated in Table 5.2, high users of electronic mail responded much more positively to bi-polars from all perspectives than did non-users, they also responded more positively than the entire survey population. Also, the T-intervals for non-users responses were very wide, indicating non-users were polarized about how they perceived e-mail.

These findings are very logical. Personnel who use e-mail frequently probably do so because they feel it is very effective, thus their perceptions towards the channel from all perspectives are very positive. This follows Steinfields' findings that e-mail use is strongly related to perceived utility. Non-users do not have experience with the e-mail system, and thus their perceptions tend to be polarized.

TABLE 5.2
ANALYSIS OF PERCEPTIONS BY DEMOGRAPHICS

High E-Mail User vs Non User

Perception	High User	Non User	Significance
Professional	1.8	2.7	.03
Sociable	2.3	3.6	.02
Satisfying	1.8	3.1	.08
Influential	2.3	3.9	.03
Hard to use	5.8	4.5	.10
Inhibiting	5.9	3.7	.00

Enlisted and Civilians vs Officers

Perception	Enl/Civ	Officers	Significance
Readable	1.8	2.1	.10
Hard to use	5.7	4.8	.01
Uncomfortable	5.7	5.0	.03

G-T Personnel vs Non G-T Personnel

Perception	G-T	Non G-T	Significance
Satisfying	2.6	3.3	.03
Influential	3.0	3.6	.05
Reliable	3.9	2.9	.01

Less than 40 years vs 40 years and over

Perception	< 40	> 40	Significance
Time saving	2.6	1.9	.01
Uncomfortable	5.2	5.9	.02

2. **Enlisted and Civilians versus Officers**

Enlisted and civilian respondents perceived e-mail to be easier to use, more readable, and more comfortable than officer respondents. This finding possibly results from each groups experiences with other organizational communications channels.

The enlisted/civilian group is composed almost entirely of civilian personnel. Although these personnel do work for the USCG, they do not have the same degree of exposure, or training, with formal USCG communication channels, particularly the record message channel. USCG officers receive training and extensive exposure to these communication channels from the day they enter the service. E-mail on the other hand is a relatively new channel in which civilians have received the same amount of exposure and training as officers.

Although officers' may perceive e-mail positively from the personal and technical perspective, strong perceptions from the organizational perspective may reduce the overall positive perception of the e-mail channel. This negative influence from the organizational perspective may result because e-mail is perceived as being a significant change from the organizational communication channels officers have been taught to use. Also, the lack of organizational policy supporting the use of e-mail for formal correspondence may be a significant factor in officers more negative perceptions of e-mail.

Civilian perceptions of e-mail from the organizational perspective may not be so greatly affected by perceived change or organizational policy. Also, civilians possibly view e-mail as being more positive from a personal perspective (comfortable, easy to use) because they do not have to access the channel via military personnel. In most cases letters, memorandums, and record messages are released by the officer who is in charge of the branch. Civilian employees must attain the approval and signature from the officer before communications they have prepared enter the channel. With e-mail, the civilian prepares and releases his correspondence without having to interact with the military supervisor.

3. G-T versus non G-T

This comparison was performed to determine if personnel who work with electronic technology perceive e-mail more positively than personnel who work in non-technical fields. The results were G-T personnel perceived e-mail to be more satisfying, more influential, and less reliable than non G-T personnel.

Interestingly, G-T personnel are more critical of e-mail reliability than others. As discussed in the previous chapter, the perception of reliability is probably affected by the nature of the CT-Mail system used at USCGHQ. Many G-T respondents specifically cited the unreliability of the CT-Mail system in the comments section of the survey. G-T personnel most likely have knowledge of the reliability capabilities that a good e-mail systems should have and thus are reacting to the inability of CT-Mail to meet their expectations.

4. Age demographics

Personnel who are over 40 years of age perceived e-mail as saving more time and being more comfortable than personnel under age 40. It was expected that the result would be the opposite because younger personnel are likely to be more comfortable with new technology and thus perceive its time saving capabilities.

The only possible explanation for this result is information gained through informal discussions with both senior and junior officers. Several senior officers stated they felt e-mail was particularly useful because they could send questions to their staff members very easily and get responses rapidly. The responses could be read at their convenience and thus not require meetings or briefings.

Several junior officers stated they felt responding to senior officers e-mail queries took up too much of their time. They felt in most cases it would more effective to provide answers in a short briefing versus having to provide detailed written responses via e-mail.

5. Summary of Demographic Analysis

The results of demographics analysis of e-mail perceptions can be summarized as follows:

- High users of e-mail perceive the channel more positively than non-users. Non-users perceptions vary over a wide range.

- Civilian personnel perceive e-mail more positively from a technical perspective than officers.

- Personnel who work with electronics technology perceive e-mail as being more satisfying and influential than personnel working in other areas of expertise. The same personnel also are more critical of the technical capabilities of the system.

- Older and more senior personnel perceive e-mail as providing time savings more so than their juniors.

The following chapter presents the results from the perceived effectiveness survey instrument.

VI. ANALYSIS OF PERCEIVED EFFECTIVENESS

A. OVERVIEW

This chapter analyzes responses to the e-mail effectiveness perception instrument. The purpose of this instrument was to determine the degree to which respondents perceived e-mail as being effective from a technological, organizational, and personal perspective. Data from the instrument was analyzed by determining mean response and T-intervals (95% confidence level) for each perception.

Correlation analysis was used to determine if responses to individual questions were related to the responses to other questions. The purpose of this analysis was to determine if there existed a relationship between responses to questions from each perspective. Questions whose responses showed a high degree of correlation with responses to other questions were used for regression analysis.

B. RESPONSES TO PERCEIVED EFFECTIVENESS INSTRUMENT

The mean response and T-interval for selected questions is presented in Table 6.1. The responses to several questions are not shown because flaws in the question design confused participants and made the resulting data questionable. For example, question number 7 asked participants if they felt e-mail would increase the number of messages they would have to read and therefore make their job more difficult. Many respondents agreed e-mail would increase the number of messages, but disagreed with statement it would make their job more difficult. A better design would separate the perceptions into two questions.

TABLE 6.1
RESPONSES TO PERCEIVED
EFFECTIVENESS INSTRUMENT

Question (#)	Interval (95%)	Mean
Easier within (1)	2.1-2.7	2.4
Easier outside (2)	2.8-3.5	3.2
Prefer job related (3)	2.8-3.5	3.1
Uncomfortable (4)	4.2-5.0	4.6
Easy to use (5)	2.3-2.8	2.6
Counter rules (6)	3.1-3.8	3.5
Dislike e-mail (8)	5.1-5.8	5.5
Significant change (10)	1.9-2.3	2.1
Resisting change (11)	3.0-3.7	3.4
Up Mgmt Attention (12)	4.2-4.9	4.6
Less Tiring (13)	4.5-5.1	4.8
Number of Meetings (14)	4.0-4.8	4.4
Amount of Travel (16)	3.4-4.1	3.8
Improve Decisions (19)	3.3-4.0	3.7
DM's w/more info (20)	3.1-3.8	3.5
Reliable (21)	3.0-3.8	3.4
Extensive use e-mail (23)	4.0-4.8	4.4
Effective comms. (24)	2.6-3.1	2.9
Appr. for formal (25)	3.7-4.8	4.1
Promotes e-mail (26)	3.4-4.1	3.8
Compatible w/rules (27)	3.4-4.0	3.8
Not use/signature (28)	3.4-4.2	3.8

C. ANALYSIS OF RESPONSES

The results of the effectiveness perception instrument are similar to those of the e-mail attitude instrument. Respondents generally responded positively to questions addressing characteristics of the channel. Participants indicated they liked e-mail, found it easy to use, felt it was an effective way of communicating, and preferred receiving task oriented information by this channel.

But respondents did not seem to perceive e-mail as helping them accomplish their tasks or providing any significant benefits to the organization. This is indicated by the strength of the responses to questions addressing the capability of e-mail to improve task performance. Most responses were very close to neutral.

The neutral responses were unexpected, especially since other studies (DEC, Hiltz and Turoff) show e-mail as providing significant efficiencies in various task areas. The responses to the e-mail attitude instrument indicates respondents seem to perceive e-mail as being an efficient channel, for example the perceptions of easy to use and time saving. But, the responses to the effectiveness instrument indicates respondents do not perceive the effectiveness of the attributes (time saving, ease of use) in helping them do their jobs.

As indicated in Table 6.1, respondents did not perceive the use of e-mail as:

* reducing the amount of travel to meet with others outside the office

* reducing the number of meetings in the office

* improving decision making

* allowing personnel to provide decision makers with more information

* being used for exchanging most correspondence

A possible explanation for why personnel perceive e-mail positively, yet do not perceive its potential effectiveness is shown in responses to organizational perspective questions. Personnel perceived e-mail as:

* not conforming to the organizational correspondence rules, especially if official correspondence was being sent
* causing a significant change in the way the USCG communicates with some degree of resistance to this change
* not being promoted by the organization or receiving adequate upper level management attention

These findings may indicate the perceived effectiveness of e-mail is being limited by perceived organizational acceptance and support of its use. As discussed in chapter 3, the USCG did not have a firm policy towards the use of e-mail when the survey was conducted. Since the survey, the USCG has promulgated a directive supporting the use of e-mail for all forms of correspondence. It would be interesting to determine if there are significant changes in perceived effectiveness after the policy has been distributed and sufficient time allowed for its implementation.

D. CORRELATION ANALYSIS

Data from the perceived effectiveness survey instrument was analyzed to determine if there existed any correlation between responses to the questions. The Pearson product moment correlation coefficient measures the degree of association between two variables [Ref. 16:p. 218]. The correlation coefficient can range between -1 and +1, where a coefficient of 0 indicates no association.

A positive correlation indicates a positive relationship between the two variables. For example, if responses to perceived reliability and perceived comfortableness were positively correlated, then as perceived reliability increased perceived comfortableness would also. A negative correlation would result in the situation where perceived comfortableness would decrease as perceived reliability increased and vice versa.

1. High Correlation

Question number 24, "e-mail is an effective way of communicating in the CG," showed medium to high degree of correlation with the responses to 11 other questions. Table 6.2 lists the questions and the degree of correlation.

TABLE 6.2
RESULTS OF CORRELATION ANALYSIS

Question (#)	Correlation
Easier within (1)	.49
Easier outside (2)	.41
Uncomfortable (4)	-.51
Easy to use (5)	.50
Dislike e-mail (8)	-.64
Up Mgmt Attention (12)	-.40
Number of Meetings (14)	.40
Improve Decisions (19)	.42
Reliable (21)	.40
DM's use inputs (22)	.43
Efficiently adapt (23)	.48

As shown in Table 6.2, the response to question number 24 has a significant positive correlation with the response to the question "electronic mail is easy to use." This result indicates that there may exist a positive relationship between the perception of ease of use and e-mail effectiveness. Furthermore, the negative correlation factors for perceptions of uncomfortableness and dislike (-.51 and-.64) indicate a positive relationship may exist between the perceptions of comfortableness and like and the perception of effectiveness. Thus, these findings indicate that there appears to exist a significant relationship between responses to question 24 (e-mail is an effective way of communicating) and responses to several questions designed to measure perceived effectiveness from the personal perspective (comfortableness, like, and ease of use).

Question 24 could be viewed as a measure of overall e-mail effectiveness, integrating the perceptions of effectiveness from all of Thayer's perspectives. Therefore, the results from correlation analysis may indicate that perceptions from the personal perspective have more of an influence on overall perceived effectiveness than perceptions from the technical and organizational perspectives. Regression analysis was used to determine the degree of influence that personal perspective perceptions have on overall perceived effectiveness. The following section discusses the results from this regression analysis.

2. Regression Analysis

Regression analysis was used to develop an equation that explains the variation of a dependent variable (in this case, response to question 24 "e-mail is an effective way of communicating in the USCG") as a result of the variation in independent variables. Questions whose responses showed a high degree of correlation with responses to question 24 were selected as the independent variables; these were questions number 4, 5, 8, 12, 21, 22, and 23 (See Table 6.2).

The analysis resulted in the following equation:

$$Q24 = 3.68 - .23(Q4) + .17(Q5) - .16(Q8) - .11(Q12) + .08(Q21) + .11(Q22) + .11(Q23)$$

where Q24 = response to question number 24 etc.

The most important result from the regression analysis is that the coefficient of determination (R^2) was found to be 67.1 %. This indicates 67% of the variability in the perception that e-mail is an effective way of communicating in the USCG is explained by the variability in the responses to the seven other questions.

Another significant result is indicated by the coefficients for each of independent variables. Reviewing the regression equation, the coefficients for questions 4, 5, and 8 were -.23, .17, and -.16, respectively; the coefficients for the remaining questions were .11 or less.

These coefficients indicate the degree of influence of the response to that particular question on the overall response to the dependent question (e-mail effectiveness). Based on these coefficients; perceived effectiveness of e-mail is strongly influenced by the degree the respondent perceives that he likes and is comfortable with e-mail, and also the degree to which he perceives that e-mail is easy to use.

E. SUMMARY

The findings discussed in the previous two section, when viewed from Thayer's effectiveness perspectives, indicate that the overall perceived effectiveness of electronic mail is related to the perceived effectiveness of e-mail from each of the Thayer's effectiveness perspectives. This is supported by the findings from correlation analysis; responses to questions designed to measure each of the perspectives exhibited significant (> .40) correlation with the question 24 "e-mail is an effective way of communicating in the USCG."

The findings from regression analysis provide insight into the degree of influence that perceived effectiveness from each of Thayer's perspectives has on overall perceived effectiveness. Based on the regression analysis findings, it appears that perceptions of e-mail from the personal perspective have a significant influence on the overall perception of e-mail effectiveness. This is indicated by the finding that perceptions of e-mail effectiveness from the personal perspective were significant factors in explaining 67% of the variability in the responses to question 24 (e-mail effectiveness).

The next chapter summarizes the findings from this study and highlights those findings that may have direct impact on the effectiveness of electronic mail for both the USCG and other organization using this communication channel.

VII. CONCLUSION AND RECOMMENDATIONS

A. OVERVIEW

This section summarizes the research and analysis conducted by this study. First, significant findings from the two analysis sections are summarized. Next, the potential impact and implications of these findings for both the USCG and other organizations are discussed. Also, this section recommends methods to incoporate these findings into strategies for improving the overall effectiveness of any USCG communication systems. Finally, areas where further investigation and study is needed are identified.

B. CONCLUSIONS

This study used a multi-perspective design, based on Thayer's three effectiveness perspectives, to determine if:

- USCG personnel attitudes towards electronic mail were significantly different by perspective than attitudes towards record messages.
- USCG personnel perceived electronic mail as an effective communication channel from each of Thayer's effectiveness perspectives.

The study demonstrated that e-mail and record message channels were perceived as being significantly different from each of Thayer's perspectives. Furthermore, the study showed that positive perceptions of effectiveness from each perspective are important to overall perceived effectiveness; and most importantly, perceptions from the personal perspective exert the most influence on overall perceived effectiveness. The following sections discuss the specific findings from this study.

1. Perception of Channel

Data analysis demonstrated that significant differences existed in USCG personnels' perceptions of the e-mail and record message channels from each of Thayers' perspectives. Specifically, this study found that e-mail was perceived to be:

- more sociable, satisfying, helpful, and comfortable than the record message channel. These perceptions represent measures from the personal perspective.
- more efficient, readable, and time saving than the record message channel. These perceptions represent measures from the technical perspective.
- less official, influential, and formal than the record message channel. These perceptions represent measures from the organizational perspective.

Summarizing, the e-mail channel was perceived to be more positive than the record message channel from the personal and technical perspective; the record message channel was perceived more positively from the organizational perspective.

2. Channel Effectiveness

Study results demonstrated that the perceived effectiveness of electronic mail is related to the degree e-mail users believe the channel is effective from each of Thayer's effectiveness perspectives. Furthermore, perceptions of effectiveness from the personal perspective significantly influence overall perceived e-mail effectiveness.

Specifically, the study found that USCG e-mail users' did not percieve the use of e-mail as:

- reducing the amount of travel or number of meetings.
- improving decision making or even allowing personnel to provide decision makers with more information.
- becoming extensively used for exchanging most correspondence.

These findings appear to result from negative perceptions of e-mail effectiveness from the organizational perspective. USCG e-mail user's believed that e-mail:

- did not conform to USCG correspondence rules, especially for official correpondence.
- represented a significant change in the way the USCG communicates information. Also, users' felt there was some degree of resistance to this change.
- was not promoted by the USCG or supported by upper level management.

The importance of perceived effectiveness from the personal perspective is shown by the results from regression analysis. This analysis demonstrated that 67.1% of the variability of responses to the question "e-mail is an effective way of communicating in the USCG" was explained by responses to questions measuring perceived e-mail effectiveness from the personal perspective.

The following section discusses the USCG implications from the perception of channel and channel effectiveness results.

C. IMPLICATIONS FOR THE USCG AND RECOMMENDATIONS

1. Implications

This study's overall results indicate that social and human concerns are important determinants of USCG electronic mail system effectiveness. To achieve a high degree of effectiveness, the system design, implementation strategies, and usage policies should be analyzed using a multi-perspective approach. This analysis should also be used to identify e-mail attributes which users do not perceive positively, such as officialness and ability to influence message receivers (organizational perspective). Based on this analysis, the USCG can determine methods, either technical or through policy change, which improve user perceptions. If change is not possible, then the USCG must realize that e-mail may be limited to certain communication tasks. The following sections discuss specific implications and recommendations for the USCG e-mail system.

a. Degree of Use

Positive perceptions of e-mail from all perspectives may significantly influence the desire of USCG personnel to use this channel (Steinfields' perceived utility findings). The results from this study demonstrate that positive perceptions from just one perspective, such as ease of use (technical or personal perspective), do not ensure overall positive attitudes towards the e-mail. Therefore, if the USCG desires to encourage the use of e-mail, negative perceptions from the organizational perspective (official, influential) must be addressed.

To improve e-mail user perceptions from the organizational perspective, and potentially the degree of e-mail use, USCG management may have to clearly state how e-mail is to be used as USCG communication channel. Also, the benefits that e-mail will provide to overall USCG tasks, such as allowing more information to be provided to decision makers, must be clearly stated. These actions would provide users with a concrete measure on which to base their perceptions from the organizational perspective.

But, USCG management must also realize that the overall effectiveness of e-mail for a particular communication task is dependent on the users' perceptions of the channel from perspectives other than organizational. Even if USCG policy states that e-mail may be used for official correspondence, attributes from both the personal and technical perspective must be evaluated to determine if they support this type of use. This is the subject of the next section.

b. Type of Use

The results from the e-mail and record message survey clearly identify significant differences between e-mail and record messages. These differences may determine the types of communication tasks the each channel can effectively handle. For example, if e-mail were used to send an official directive, the overall effectiveness of the communication may be significantly less than if the directive were sent via the record message channel. This would occur because users perceive the record message channel as being more influential and official than e-mail. Conversely, e-mail would be more effective than record messages for communication tasks such as requesting opinions or information gathering. This is because users perceive e-mail to be more sociable, helpful, and comfortable.

Based on the above discussion, not only must the USCG acknowledge the differences in communication channels from Thayer's perspectives, but must also identify differences in communication tasks and determine the appropriate channel to complete the task. This analysis will allow the USCG to match communication tasks to the channel that will most effectively accomplish the desired result.

The following section summarizes recommended actions to improve the effectiveness of e-mail use in the USCG.

2. Recommendations

The following actions are recommended as possible methods of improving the overall effectiveness of the USCG electronic mail system.

a. Analysis of Communication Tasks

USCG communication tasks should be analyzed using a multi-perspective design such as the one used in this study. The results from this analysis would help the USCG identify communication tasks which could be most effectively handled by electronic mail. Communication tasks whose attributes from each perspective closely match the attributes of the e-mail channel would be logical choices.

b. E-mail Policy and Support

This study's results indicate USCG personnel are uncertain about how e-mail is to be used as an organizational communication system. Also, personnel do not perceive how e-mail can help them accomplish their tasks. USCG management should address these concerns by:

- developing guidelines on how e-mail is to be used for communicating information in the USCG. The findings from this study and the communication task analysis discussed above should be used as a guide.

- educating USCG personnel on the potential benefits that e-mail can provide in accomplishing USCG tasks. This type of information should dessiminated through USCG professional journals and seminars. Emphasis should be given to exposing actual applications where e-mail has been proven to be an effective communication system.

Finally, much more empirical research is needed to further identify the effects of communication systems such as e-mail on social and human aspects of organizational life, particularly those aspects which determine the overall effectiveness of these systems. The following section discusses possible follow-on study efforts.

D. AREAS FOR FURTHER STUDY

This study investigated the effectiveness of electronic mail from three very broad perspectives; follow on studies are needed to further investigate this topic by:

- Narrowing the focus of the study to one perspective.
- Measuring the effectiveness of actual communications sent over a variety of communication systems.

The following sections outline potential follow-on study designs.

1. Perspective Studies

Many of the bi-polars used by this study to measure perceptions from one perspective appeared to measure user perception from several perspectives. Changes in either the bi-polars selected or the experimental design could better isolate perceptions to just one perspective. One possible method is to ask survey participants to respond to either bi-polars or questions based on only one perspective. Further studies of the effects of user attitudes from a variety of perspectives are necessary if organizations are to truly experience the increases in productivity that high technology communication systems such as e-mail offer.

2. Effectiveness Studies

Further empirical research is needed to identify the effects of channel on communication effectiveness. One method of analyzing channel effects would be to actually send an identical communication over several different channels.

Then, measure the effectiveness (perceived or actual) of the message from the receivers' perspective for each of the channels. The analysis should then identify differences between channels from a multi-perspective viewpoint and determine if there exist any relationships between the channel differences and effectiveness of message. Additional information could be gained by varying the type of communication sent; for example, varying in terms of task and social content. A study of this nature could provide significant insight into the channel attributes necessary for effective communication of various types of messages.

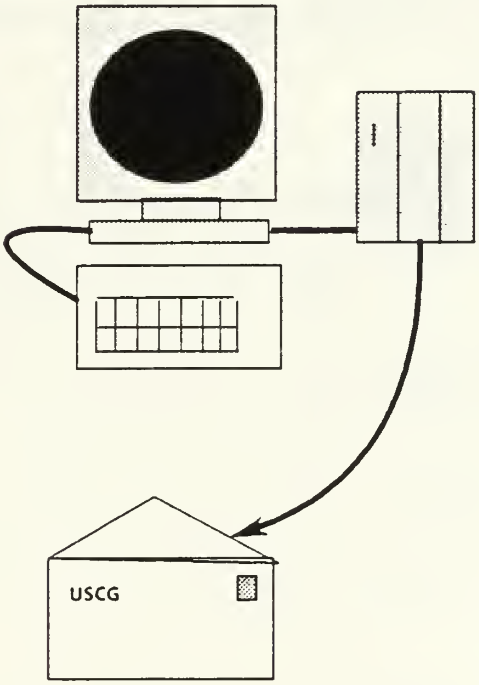
In summary, organizations must investigate the effects that communication systems have on the social fabric of their organization. The information gained from these types of investigations can help organizations develop communication systems which are both efficient and effective.

APPENDIX A

SURVEY INSTRUMENT

ELECTRONIC MAIL

SURVEY



Dr. J. E. Suchan
LT R. E. Day

IMPORTANT NOTE

1. THIS SURVEY IS INTENDED TO ASSESS YOUR ATTITUDES TOWARDS ELECTRONIC MAIL IN GENERAL. PLEASE **DO NOT** BASE YOUR RESPONSES ON YOUR ATTITUDE TOWARDS ANY PARTICULAR TYPE OF ELECTRONIC MAIL SYSTEM.

2. IF YOU USE ANY ELECTRONIC MAIL SYSTEM OTHER THAN C-T MAIL, PLEASE LIST THE SYSTEM TYPE BELOW.

SYSTEM TYPE ______________________________________

MESSAGE ATTITUDE SURVEY

Please indicate your attitude toward Coast Guard messages by responding to each of the eighteen pairs of contrasting items listed on the next page. Place an "X" near the item that best describes your current feeling, attitude, or perception towards record messages. Please base your responses entirely on your feeling or attitudes toward messages, not merely on your reactions to the words used in the contrasting items.

PROFESSIONAL ___ ___ ___ ___ ___ ___ ___ UNPROFESSIONAL
1 2 3 4 5 6 7

For example, if you feel messages are
A. VERY PROFESSIONAL.................. you would check # 1;
B. PROFESSIONAL........................ you would check # 2;
C. SOMEWHAT PROFESSIONAL............. you would check # 3;
D. NEUTRAL............................ you would check # 4;
E. SOMEWHAT UNPROFESSIONAL........... you would check # 5;
F. UNPROFESSIONAL..................... you would check # 6;
G. VERY UNPROFESSIONAL................ you would check # 7;

Use this guideline to respond to each item on the next page.

ELECTRONIC MAIL ATTITUDE SURVEY

Please indicate your attitude toward Electronic Mail by responding to each of the eighteen pairs of contrasting items listed on the next page. Place an "X" near the item that best describes your current feeling, attitude, or perception towards E-Mail. Please base your responses entirely on your feeling or attitudes toward E-Mail, not merely on your reactions to the words used in the contrasting items.

PROFESSIONAL ___ ___ ___ ___ ___ ___ ___ UNPROFESSIONAL
1 2 3 4 5 6 7

For example, if you feel Electronic Mail is

A. VERY PROFESSIONAL.................. you would check # 1;
B. PROFESSIONAL....................... you would check # 2;
C. SOMEWHAT PROFESSIONAL.............. you would check # 3;
D. NEUTRAL............................ you would check # 4;
E. SOMEWHAT UNPROFESSIONAL............ you would check # 5;
F. UNPROFESSIONAL..................... you would check # 6;
G. VERY UNPROFESSIONAL................ you would check # 7;

Use this guideline to respond to each item on the next page.

1. PROFESSIONAL	1	2	3	4	5	6	7	UNPROFESSIONAL
2. SOCIABLE	1	2	3	4	5	6	7	UNSOCIABLE
3. INEFFICIENT	1	2	3	4	5	6	7	EFFICIENT
4. HELPFUL	1	2	3	4	5	6	7	UNHELPFUL
5. INFORMAL	1	2	3	4	5	6	7	FORMAL
6. READABLE	1	2	3	4	5	6	7	HARD TO READ
7. SATISFYING	1	2	3	4	5	6	7	UNSATISFYING
8. INFLUENTIAL	1	2	3	4	5	6	7	UNINFLUENTIAL
9. HARD-TO-USE	1	2	3	4	5	6	7	EASY-TO-USE
10. CONFIDENTIAL	1	2	3	4	5	6	7	NOT CONFIDENTIAL
11. TIME SAVING	1	2	3	4	5	6	7	TIME WASTING
12. APPROPRIATE	1	2	3	4	5	6	7	INAPPROPRIATE
13. UNCOMFORTABLE	1	2	3	4	5	6	7	COMFORTABLE
14. RELIABLE	1	2	3	4	5	6	7	UNRELIABLE
15. PLEASANT	1	2	3	4	5	6	7	AGGRAVATING
16. INHIBITING	1	2	3	4	5	6	7	UNINHIBITING
17. VALUABLE	1	2	3	4	5	6	7	NOT VALUABLE
18. OFFICIAL	1	2	3	4	5	6	7	UNOFFICIAL

ELECTRONIC MAIL SURVEY

INSTRUCTIONS

Listed below you will find twenty eight statements related to various aspects of Electronic Mail. Indicate the extent to which you agree or disagree with the following statements by checking the appropriate response. Please consider each question independent of your answers to other questions. The terms electronic mail and E-mail are synonymous.

1. I feel that Electronic Mail makes it **easier** for me to communicate with others involved with CG command, control, and communications.

__________ /	________ /	__________ /	________ /	__________ /	________ /	__________
Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

2. I believe that E-mail makes it **easier** for me to communicate with others **outside** the command, control, and communications specialty.

__________ /	________ /	__________ /	________ /	__________ /	________ /	__________
Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

3. I prefer receiving job-related messages via E-mail rather than other correspondence methods.

__________ /	________ /	__________ /	________ /	__________ /	________ /	__________
Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

4. Using E-mail to send most of my correspondence makes me feel **uncomfortable**.

__________ /	________ /	__________ /	________ /	__________ /	________ /	__________
Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

5. It is **easy** to use Electronic mail.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

6. If "official" communications were sent via E-mail, this change would run counter to the CG's current correspondence rules.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

7. Because of E-mail, the number of messages I will have to read will **increase** and therefore by job will be more difficult.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

8. I **dislike** using Electronic mail.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

9. The amount of lateral communication in my office is **unsatisfactory**.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

10. If most communications were sent via E-mail, this would represent a **significant change** in the way the CG communicates information.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

11. I believe that many people in the CG are **resisting** the change to E-mail.

__________/_______/_________/_______/_________/_______/_________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

12. I believe that upper level management has given **too much** attention to E-mail.

__________/_______/_________/_______/_________/_______/_________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

13. Reading messages on a computer for an average of an hour a day would be **less tiring** than reading traditional, hard-copy messages for the same time period.

__________/_______/_________/_______/_________/_______/_________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

14. Using E-mail will cut down on the number of meetings held in my office.

__________/_______/_________/_______/_________/_______/_________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

15. Interaction with my co-workers is important to my job satisfaction.

__________/_______/_________/_______/_________/_______/_________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

16. Using E-mail will cut down on the amount of travel used to meet with people outside my office.

__________/_______/_________/_______/_________/_______/_________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

17. I am satisfied with the amount of communication I receive from my superiors.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

18. If most communications were sent via E-mail, the number of times I personally interact with others for business purposes will **decrease**.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

19. E-mail will **improve** decision making in the Coast Guard because upper level management will have more and quicker access to information from subordinates.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

20. E-mail will enable me to provide decision makers with more information.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

21. I believe E-mail is a **reliable** method of conveying information to its intended receiver.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

22. Decision makers in the CG use the input of subordinates to help them make decisions.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

23. I believe the CG will quickly and efficiently adapt to the extensive use of E-mail for most correspondence.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

24. E-mail is an effective way of communicating in the CG.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

25. E-mail is an appropriate method to send and receive **formal** communications within the CG.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

26. The CG promotes the use of E-mail.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

27. The use of E-mail is compatible with the CG's communication rules.

__________/________/__________/________/__________/________/__________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

28. E-mail should **not** be used for communicating official correspondence because the writer cannot sign the correspondence.

__________/_______/_________/_______/_________/_______/_________

Strongly Agree	Agree	Somewhat Agree	Neutral	Somewhat Disagree	Disagree	Strongly Disagree

General Questions

1. During a typical week, what percentage of the time you spend communicating is devoted to

Writing messages ___________
Reading messages ___________
Phone conversations ___________
Informal discussions ___________
Meetings and briefings ___________
Other ___________

Percentages should add up to 100%

2. During a typical week, what percentage of the written correspondence you receive is in the form of

Letters ___________
Memos ___________
Short reports (< 3 pgs) ___________
Long reports (> 3pgs) ___________
E-mail ___________
Facsimile ___________
Other ___________

Percentages should add up to 100%

3. I have a computer on or near my desk. YES ____ NO ____
4. I currently use a computer to do my writing. YES ___ NO ___
5. I had difficulty learning to use a computer. YES ___ NO ____
6. I feel comfortable using computers to communicate with others. YES _____ NO ______
7. I currently use E-mail. YES ____ NO ____

a. If answer was yes, how many business related messages do you send via E-mail per week. ______ (Enter #)

b. What percentage of the total amount of business correspondence you send per week does the above number represent. ________ (Enter %)

Background Information

Please answer the following questions by checking the category that best describes you. Your responses will be kept confidential.

8. What is your age group?

Under 30 ______ 41-50 _______
31-40 ______ Over 50 ______

9. What is your gender?

Male _______ Female ______

10. Rank/Grade (ie. E-4, O-4, GS9) _______
11. Division and branch (ie. G-TPP-1) _______
12. How many people do you supervise _______

Personal Comments

The following space is provided for you to provide your personal comments on your feelings and attitudes towards the use of E-mail in the USCG. Of particular interest is what types of correspondence do you feel should be sent via E-mail.

____
____
____
____
____
____
____
____
____
____
____

Your participation in this survey is sincerely appreciated. If you are interested in obtaining a summary of the survey results and an interpretation of their significance please write your name and address below.

NAME ______________________________________
ADDRESS ____________________________________
CITY __________________ STATE ______ ZIP _______

APPENDIX B

MOTIVATIONAL LETTER

Memorandum

U.S. Department
of Transportation
**United States
Coast Guard**

Subject ELECTRONIC MAIL SURVEY

Date MAR 22 1988

2090
Ser: 18068

Reply to Attn of: LT DAY
G-TPP/HRP
267-1345

From G-Td

To All G-T personnel

1. The purpose of this survey is to assess the attitudes of Coast Guard personnel towards electronic mail. The survey is being conducted by LT Robert Day. LT Day is attending the Telecommunications Management program at the Naval Post Graduate School, Monterey, CA.

2. Please take the time to particapate in the survey. The survey is self administered and takes approximately 10 to 12 minutes to complete. Your support will be sincerly appreciated.

D. A. NAPLES

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